RESOURCE POLYMERS INC.

GHG Emission Reductions Verification Report

Resource Polymers Inc.
119 Princess Street
Hamilton, Ontario Canada L8L 6B7

Prepared:
March 14, 2011

GHG Emission Reductions Project Historical Basis

Resource Polymers Inc**.** is a privately owned company specializing in the recycling of post-industrial, post-consumer and post-commercial plastics with emphasis on low density polyethylene, high density polyethylene and polypropylene. The Company was founded in 2004, and began operations in a 25,000 square foot plant with four employees. Today the company has over 10 employees and operation run 24 hours a day. The company has created its own proprietary wash line for separating recycled plastic compounds and also has a shred line, and an extrusion line for the recycling of plastics. The principals of this company have been recycling for nearly thirty-five years and the company has a dedication to the environment. The company predominantly recycled automotive grade recyclable plastics from leading automotive supply companies.

The company has grown by about 55% in the last three years and continues to expand. The company is currently doing business across Canada and the United States and is in the process of finalizing agreements to do business in Mexico. The company is also looking to increase production to Brazil and Chile for continuing processing operations.

This report shows and explains the greenhouse gas emission reductions of Resource Polymers Inc. as this company is helping to save virgin inputs in plastic production through recycling.

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Acroynyms

CH_4 Methane
CO2 Carbon dioxide
EIA Environmental Impact Assessment
GHG Greenhouse Gas
HDPE High density polyethylene
IPCC Intergovernmental Panel on Climate Change
LDPE Low density polyethylene
N2O Nitrous oxide
PET Polyethylene terephthalate
PP Polypropylene
PS Polystyrene
VER Verified Emission Reduction

EXECUTIVE SUMMARY
Project title

Resource Polymers Inc. – Canadian Plastics Recycling

Project Type and methodology

The greenhouse gas emission reductions project has been done according to *ISO 14064-2 standard Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.* EPA methodology – Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks – has been used to calculate the emissions reduction.

Project location

The project is located in Hamilton, Ontario Canada.
Resource Polymers Inc.
119 Princess Street
Hamilton, Ontario Canada L8L 6B7

Latitude: 43°.2587073"N
Longitude: -79.°834248"O

Contacts:

Resource Polymers Inc.
Contact: W.R. Lieberman
545 Eighth Avenue, Suite 401
New York, NY United States of America **www.resourcepolymers.com**

Project description

The project consist in quantifying greenhouse gas emissions attributed to the different plastic resin recycling proceeds. Thus the company emissions will be calculated and a baseline scenario will be use as comparison to get the net emission reduction.

This GHG emission reductions project consists in recycling post-consumer and postindustrial plastic material such as polyethylene (LDPE & HDPE) and polypropylene (PP) and polystyrene (PS). The resulting recycled materials are in the form of granules to be used as raw materials by plastic consumer product manufacturers. These recovering and recycling project activities are additional to a baseline scenario which consists in using the option of producing plastic with virgin raw material.

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[1]EPA, (2006). Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks,
Internet link: http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

Starting and ending date

The project started in June 2004 and ends in December 2034.

Emission reductions present and future

GHG offsets and Emission Reductions per year

Allowance	Total Emission Reductions
Year	tCO_2 equiv.
Goods	VER
2004	100,000
2005	100,000
2006	100,000
2007	100,000
2008	100,000
2009	100,000
2010	100,000
2011	100,000
TOTAL	**800,000**

Future Emission Reductions and Offset Objectives

Allowance	Total Emission Reductions
Year	tCO_2 equiv.
Goods	VER
2012-2015	400,000
2016-2020	500,000
2021-2025	500,000
2026-2030	500,000
2031-2034	500,000
TOTAL	**2,400,000**

INTRODUCTION

Resource Polymers Inc**.** is a privately owned company specializing in the recycling of post-industrial, post-consumer and post-commercial plastics especially low density polyethylene, high density polyethylene and polypropylene.

It was founded in 2004, and began operation in a 25,000 square foot plant with two employees. Today the company has over 10 employees and operation run 24 hours a day. The company has created its own proprietary wash line for separating recycled plastic compounds and also has a shred line, and an extrusion line for the recycling of plastics. The principals of this company have been recycling for nearly thirty-five years and the company has a dedication to the environment. The company predominantly recycled automotive grade recyclable plastics from leading automotive supply companies.

The company has grown by about 55% in the last three years and continues to constantly grow. The company also offers a variety of different services to their customer and does business across Canada, and the United States. The company is currently in the process of doing business in Mexico and looking at Brazil and Chile for continuing processing operations.

This report will explain the greenhouse gas emission reductions of Resource Polymers Inc. since the company is helping to save virgin input in plastic production through recycling.

PROJECT OUTLINE

Project proponent

The project proponent is Resource Polymers Inc. which is the owner and operator of Resource Polymers Inc. Resource Polymers is currently seeking to acquire additional plastics recycling operations on world wide level. Resource Polymers has set a mandate for all of its operations to be Carbon neutral and to facilitate

the reduction in waste streams to landfills through the use of recycling plastic compounds.

Recipients of Report and Audience

This report on quantifying the reduction of GHG emissions is aimed mainly at the board of directors of the Resource Polymers Inc who are responsible for organizational development of the company. Since the project was undertaken as part of the company's free will, the report will also be forwarded to the financiers and local government officials where the project takes place. The operators of the facility will be advised of the plans to make sure strict adherence to operating procedures is followed through.

GHG Clean Projects Registry

This report will showcase projects' greenhouse gas (GHG) emission reductions or removals, serialize verified emission reductions and removals and provide an locate examples to similar types of projects that can help reduce their GHG emissions.

This report Utilizing the ISO 14064-2 & 3 Standards, will quantify emission reducing plastics recycling project.

Statement of Reductions

This report will describe the emission reductions of 1,005,717 tons of tCO2 measured against the base line.

Verification Report

The real reduction of GHG emissions will be verified by an independent auditor, as stipulated in ISO Standard 14064-3. The study of raw data from the processed line will provide precise methodology for calculation make it possible to verify and validate all reductions. The company is in final stages of finalizing Validation report from organizations that have been identified as third-party verifiers for GHG emission removals/reductions projects listed in the **GHG Clean Projects™ Registry.**

1.0 GENERAL REQUIREMENT

1.1 Relevant GHG Schemes and Methodology

ISO 14064-2:06 standards and the **Environmental Protection Agency** methodology *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* is used as good practice to identify sources, sinks and reservoirs (SSRs) for the project and baseline scenario. It also serves as a good practice guidance to quantify, monitor and report GHG emissions and emission reductions

2.0 PROJECT DESCRIPTION

2.1 Project description

This project consist in quantifying greenhouse gas emissions attributed to plastic resins recycling proceeds. The company emissions will be calculated and a baseline scenario will be use as comparison to get the net emission reduction.

2.2 Project location

The project is located in Hamilton, Ontario Canada.
Resource Polymers Inc.
119 Princess Street
Hamilton, Ontario Canada L8L 6B7

Latitude: 43°.2587073"N
Longitude: -79.°834248"O

2.3 Inputs and sources of input

Inputs are post-consumption or post-industrial plastic residues. These are mainly LDPE, HDPE, PP and PS.

2.4 GHG general information

The main greenhouse gases responsible for global warming are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbon (HFC), perfluorocarbon (PFC), sulphur hexafluoride (SF_6).

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[2]EPA, (2006). Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks,
Internet link: http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

A large amount of carbon is released to the atmosphere when raw materials in plastic composition are extracted. Petroleum is the principal source of GHG emissions related to this extraction. By recycling and transforming the plastics in new basic material, the company avoids emissions from extraction and delays the release of CO_2 into the atmosphere.

2.5 Project technologies and products

Resource Polymers goes through different stages to get its final products. First, the plastic is manually sort into polymer type and/or color. Following sorting, the plastic is shredded, goes through densification and extrusion. After the extrusion the plastic is processed into granules. The final product is granule of different colors and different polymers.

2.6 Identification of Resource Polymers Inc. greenhouse gas

The main greenhouse gases identified in the production of Resource Polymers are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O)

2.7 Plastic materials

In Ontario we have identified six (6) different types of plastic:
1- Polyethylene terephthalate
2- high density polyethylene
3- low density polyethylene
4- polypropylene
5- polystyrene
6- other plastic

2.8 Plastic recycling

The main plastic recycled in Ontario is: high density polyethylene, low density polyethylene and polypropylene. They composed 60% of all recycled plastic and polystyrene account for 40%.

2.9 Project proponents and relevant stakeholders

Resource Polymers Inc.
Contact: W. R. Lieberman
545 Eighth Avenue , Suite 401
New York, New York, United States of America

2.10 Project consultant

This project has had no consultant; the company has formulated this project themselves following all proper guidelines and direction. The reports are drafted in accordance with the following guidelines: ISO 14064.

2.11 Summary environmental impact assessment

An environmental impact analysis is not required for this GHG project. There are no negative environmental impacts resulting from the project.

3.0 DETERMINING THE BASELINE

The baseline is the most appropriate and best estimate of a reference scenario for which the project can be compared to. The baseline scenario covers the same temporal range as the project.

3.1 Baseline scenario

The chosen baseline scenario is the production of low density polyethylene (LDPE), high density polyethylene (HDPE), polypropylene (PP) and polystyrene (PS) from virgin inputs. This include emissions from the extraction of those virgin inputs, from the production of LDPE, HDPE, PP & PS, from transportation and waste management. Since these data are not available directly, it was necessary to identify the relevant factors from a recognize methodology. Selected factors have been chosen from EPA methodology[3].

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[3] EPA, (2006). Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks,
Internet link: http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

4.0 IDENTIFYING GHG SOURCES, SINKS AND RESERVOIRS RELEVANT FOR THE BASELINE

This plastic production hypothetical scenario is used to calculate the difference between the actual plastic production project scenario (Resource Polymers). All Greenhouse gases and emission factors have been taken from EPA (2006)[4].

4.1 Selection and Identification of GHG sources, sinks and reservoirs

The emission sources come from the production of raw material, transportation of raw material to the transformation plant, transport of transformed products to the different consumer markets as well as material scrap to sanitary landfill or recycling plants.

Gases involved in the baseline scenario are: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

Extracting the raw material and production of plastic resin need the consumption of electricity and fuel.

Baseline Scenario Description and Selection

Baseline scenario was selected among alternative scenarios representing what would have happened without this project. If this project had not been implemented, an equivalent production of virgin material would have been used. Thus, the project will be compared to the virgin raw material scenario. The use of virgin material effectively generates some waste management activities and is realistic as a baseline scenario. With the use of a virgin material scenario, in the case of raw material acquisition and manufacturing methodology, waste management process and transportation emissions are accounted for in the manufacturing stage

Identification of the Project and Baseline Emission Sources, Sinks and Reservoirs

The GHG emission sources, sinks or reservoirs (SSRs) identified were analyzed following the EPA methodology[4] for a recycling scenario and in conformity with the requirements of the ISO 14064 part 2 standards.

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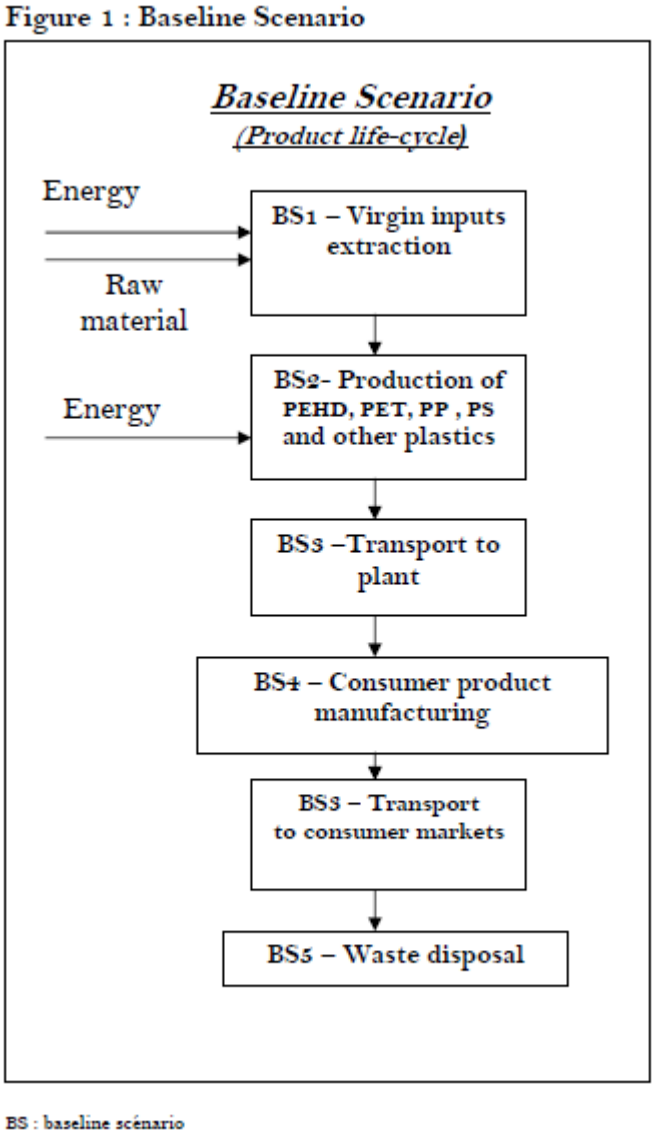
[4]EPA, (2006). Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks,
Internet link: http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

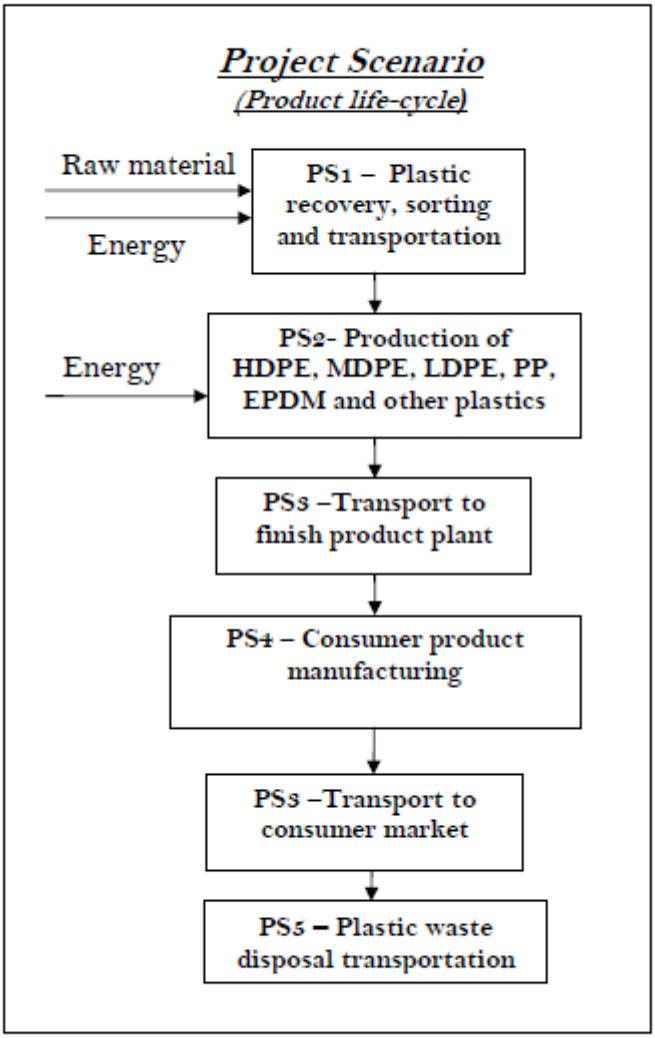
Figure 1: Project and Baseline Scenario Sources



Baseline Scenario (BS1, BS2, BS3, Bs4, BS5)

This source of GHG includes: 1) Raw materials acquisition from mining operation or fuel a blast furnace and the transportation to the recycling plant. 2) The production of plastic (granules) from virgin inputs, sold to the consumer product manufacturer. 3) Transport of the plastic (granules) to the product manufacturers.

Figure 2 : Project Scenario



PS : Project scénario

Project Scenario (PS1, PS2, PS3, PS4, Ps5)

This source of GHG includes: 1) The recovering of plastic from a material recovery facility (MRF) and industrial enterprise, its sorting and the transportation to the recycling plant. 2) The production of plastic (granules) from post consumer and industrial plastic products, sold to the consumer product manufacturer; shredding and extruding are among the significant process operations. 3) Transport of the plastic (granules) to the product manufacturers.

Table 1: Emission sources comparison (metric ton of CO_{2e})

Virgin Raw Material Baseline Scenario		Recycling Project Scenario	
	Emission factors - No project - (Factors – MTCE/Short ton of product)		Emission factors - Project - (Factors – MTCE/Short ton of product)
BS1: Raw Material (virgin material) extraction	Quantified sources : EPA emission factors[8]	**PS1:** Plastic recovery, sorting and transportation	Quantified sources : EPA emission factors[9]
BS2: Production HDPE, MDPE, LDPE PP, Other plastics	HDPE = 0,54 MDPE,= 0,59 LDPE = 0,64 PP = 0,59 Other plastics = 0,59	**PS2:** Production HDPE, MDPE, LDPE PP, Other plastics	HDPE = 0.05 MDPE = 0.05 LDPE = 0.05 PP = 0.05 Other plastics = 0.05
BS3: Transport to Consumer product plant		**PS3:** Transport to Consumer product plant	

BS: Baseline Scenario GHG emission source
PS: Project Scenario GHG emission source

The EPA GHG emission factors shown in Table 1 include the manufacturing process and the transportation emissions for the production of HDPE, LDPE and PP for both the project (recycling) and baseline (virgin raw materials) scenarios. See p.17-18 of the EPA *Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks*:

"In manufacturing, substantial amounts of energy are used both in the acquisition of raw materials and in the manufacturing process itself. EPA developed separate estimates for GHG emissions from process and transportation energy for virgin inputs and recycled inputs, generating a total of four separate GHG emission estimates for each material: (1) process energy with virgin inputs, (2) process energy with recycled inputs, (3) transportation energy for materials made from virgin inputs, and (4) transportation energy for materials made from recycled inputs

These emission factors also consider the process of nonenergy emissions. See the definition of "nonenergy emissions" at pg 11 of the EPA Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks:

"Process Nonenergy GHG Emissions: Some GHG emissions occur during the manufacture of certain materials and are not associated with energy consumption. In this analysis these emissions are referred to as *process nonenergy emissions*.

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5 EPA, (2006). Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks, exhibit 2-2, p.24.
Internet link: http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html
6 EPA, (2006). Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks, exhibit 2-2, p.24.
Internet link: http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

For example, the production of steel or aluminum requires lime (calcium oxide, or CaO), which is produced from limestone (calcium carbonate, or CaCO3), and the manufacture of lime results in CO2 emissions. Other process nonenergy GHG emissions are associated with the manufacture of plastics, office paper, and medium-density fiberboard. In some cases, process nonenergy GHG emissions are associated only with production using virgin inputs; in other cases, these emissions result when either virgin or recycled inputs are used."

5.0 QUANTIFYING GHG EMISSIONS

5.1 Choice of methodology

The choice of methodology of quantification has been done among all recognized methodologies available like Intergovernmental Panel on Climate Change (IPCC), U.S. Environmental Protection Agency, Environment Canada and recognized quantification protocols.

We have chosen EPA study: Solid Waste Management and Greenhouse Gases A Life-Cycle Assessment of Emissions and Sinks [5], this study on many materials life cycle allow us to understand what life cycle steps we should consider.
EPA takes into consideration the emissions related to the following stages in the product life cycle of every plastic used by the company:

- Extraction and industrial proceed related to raw materials or virgin input
- Products manufacturing;
- Waste management;
- Transportation of materials or products from a life cycle to another.

The company can avoid the GHG emission related to the extraction and production of virgin inputs, manage recycled plastic manufacturing and avoid emission to landfill management. All other emissions are similar in both scenarios.

Based on this listing, we can conclude than Resource Polymers, manufacturer of plastic products (LDPE, HDPE, PP & PS) identified by the EPA methodology is responsible and own the emission reductions and emissions avoided of these products.

5.2 Methodology description and justification

Calculation of avoided emission (VI) takes into consideration what would have been generated by raw material production. In fact, if we consider the baseline scenario, new plastic would have been produced because post-industrial plastic would have been eliminated. Two types of data are used: specific emission factors and quantity (metric tons) for each types of plastics (LDPE, HDPE, PP and PS). Quantity is provided by Resource Polymers. Specific emission factors for each plastic resins are available through EPA(2006) and take into consideration emissions produced by energy and non-energy process as well as transportation. Virgin inputs emission factors (converted from MTCE to tm CO_{2e}) for low density polyethylene is 2.35 tm CO_{2e}, high density polyethylene is 1.98 tm CO_{2e}, polypropylene is 2.16 tm CO_{2e} and polystyrene is 2.16 tm CO_{2e}.[6]. Thus, by multiplying plastic quantity by the plastic emission factor we get the tons of CO_{2e} that will be emitted by the production of plastic using virgin inputs.

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[7] EPA (2006), Solid Waste Management and Greenhouse Gases, A Life A Life-Cycle Assessment of Emissions and Sinks : page 24: lien http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

Produced emissions (PE) takes into consideration the energy consumption used to recycle the plastic. Calculation use two types of data: quantity and emission factor for plastic recycling.

Quantity data (Q) are provided by the company and emission factors (EF) are available at the US Environmental Protection Agency (EPA). Recycled inputs emission factors (converted from MTCE to tm CO_{2e}) for low density polyethylene, high density polyethylene, polypropylene and polystyrene is 0.18 tm CO_{2e}.[7] EPA methodology has calculated an approximate loss of 22% of recovered material, before sorting, applicable to all plastic.[8]

Finally in order to be conservative and to adjust the calculation with the available data, EPA's waste tonnage factors will be apply to production tonnage.

5.3 Set-up formula to calculate the emissions

Avoided Emission

This formula takes into consideration the emissions that would have been generated by the production of virgin inputs. Manufacturing and transportation are included in the emission factors as well as non-energy proceedsthat generate GHG emissions.

$VI = (QL * EF_L) + (QH * EF_H) + (QP * EF_P) + (QPS * EF_{PS})$ [9]

VI = Total emissions resulting from the production of virgin inputs in n MTCE (metric ton carbon equivalent);
QL = LDPE plastic quantity (metric ton);
QH = HDPE plastic quantity (metric ton);
QP = PP plastic quantity (metric ton);
QPS = PS plastic quantity (metric ton);
EF_L = GHG emission factor (ton CO2e) per ton of LDPE (2.35). This factor takes in consideration the emissions related to proceed and transportation;
EF_H = GHG emission factor (ton CO2e) per ton of HDPE (1.98). This factor takes in consideration the emissions related to proceed and transportation;
EF_P = GHG emission factor (ton CO2e) per ton of PP (2.16). This factor takes in consideration the emissions related to proceed and transportation;
EF_{PS} = GHG emission factor (ton CO2e) per ton of PS (2.16). This factor takes in consideration the emissions related to proceed and transportation;

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[8] EPA (2006), Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks, tableau 2.2, p.24
[9] EPA (2006), Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks, tableau 2.2, p.24
[10] EPA (2006), Solid Waste Management and Greenhouse Gases, A Life A Life-Cycle Assessment of Emissions and Sinks : page p.36, exhibit 3-3: lien http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html
[11] EPA (2006), Measuring Greenhouse Gas Emissions from Waste, Disponible sur le site: http://epa.gov/climatechange/wycd/waste/measureghg.html#balance, consulté le 3 février 2007.

Project emissions

Emissions generated by plastic recycling are included in this calculation. These emissions include recycling proceed and transportation of plastic materials as well as non-energy proceeds that generate GHG emissions.

$PE = (QRL + QRH + QRP + QRPS) * EF_R$

PE = Emissions related to recycling (ton CO_{2e});
QRL = Recycled LDPE plastic quantity (metric ton);
QRH = Recycled HDPE plastic quantity (metric ton);
QRP = Recycled PP plastic quantity (metric ton);
QRPS = Recycled PS plastic quantity (metric ton);
EF_R = GHG recycle emission factor (ton CO_{2e}) per ton of LDPE (0.18), HDPE (0.18), PP (0.18), PS (0.18). These factors take in consideration the emissions related to proceed and transportation [8];

12 EPA (2006), Solid Waste Management and Greenhouse Gases, A life-Cycle Assessment of Emissions and Sinks, tableau 2.2, p.24

6.0 SUMMARY OF GHG EMISSIONS FROM THE BASELINE

Section 5.3 detailed formulas that must be used to calculate emissions related to the baseline scenario. Here are the result calculations for the baseline scenario. Calculation for emissions and reductions related to plastic resin production starts in 2004. This year have been chosen since production numbers was available from this date. We had enough information to confirm a management plan from 2004 to 2034.

Given that the aim of this emission reduction quantification report is to sell those credits. We have enough data to illustrate

The effectiveness of the project scenario compare to the baseline scenario.

Table 2 Summary of baseline scenario

	LDPE	HDPE	PP	PS	Total CO2e
2004	95344.8	4767.2	2860.3	23836.2	126808.6
2005	95474.3	4773.7	2864.2	23868.6	126980.8
2006	101456.9	5072.8	3043.7	25364.2	134937.7
2007	110155.3	5507.8	3304.7	27538.8	146506.5
2008	111454.2	5572.7	3343.6	27863.6	148234.1
2009	112453.7	5622.7	3373.6	28113.4	149563.4
2010	125672.4	6283.6	3770.2	31418.1	167144.3
2011	145051.2	7252.6	4351.5	36262.8	192918.1
Production Virgin Inputs					1193093.5

7.0 SUMMARY OF GHG EMISSIONS FROM THE PROJECT

Section 5.3 detailed formulas that must be used to calculate emissions related to the baseline scenario. Here are the result calculations for the project scenario. We have also considered controlled and related emissions from energy consumption which is used to produce plastic resins. We used the following emission factors in the calculation:

	CO_2	CH_4	N_2O
Diesel[9]	0,00273 t /	0,000000133 t /	4E-07 t / L
Electricity[10]	0,0000215 t CO_{2e} / kWh		
Natural Gas[11]	0,001891 t / m_3	0,000000037 t / m_3	3E-08 t / m_3
Propane[12]	0,00151 t /	0,000000024 t /	1E-07 t / L

Emission factors in Metric Ton

On the other hand, those calculations do not have to be taken in consideration given that the EPA methodology include already the energy consumption in the emission factors.

Table 3 Summary of project scenario

	LDPE	HDPE	PP	PS	Total CO2e
2004	13213.0	330.3	13.2	1982.0	15538.5
2005	14002.0	350.1	14.0	2100.3	16466.4
2006	15234.0	380.9	15.2	2285.1	17915.2
2007	15277.0	381.9	15.3	2291.6	17965.8
2008	22932.0	573.3	22.9	3439.8	26968.0
2009	24832.0	620.8	24.8	3724.8	29202.4
2010	26732.0	668.3	26.7	4009.8	31436.8
2011	27111.0	677.8	27.1	4066.7	31882.5
Production Recycled Inputs					187375.6

13 Environment Canada - National Inventory Report 1990-2005 Table A12-2 p.653
14 Hydro-Québec: Emissions de gaz à effet de serre des options de production d'électricité, Figure 1: average of 2 emission factors : hydro and reservoir
15 Environment Canada - National Inventory Report 1990-2005 Table A12-1 p.651
16 Environment Canada - National Inventory Report 1990-2005 Table A12-1 p.651

8.0 QUANTIFYING GHG EMISSION REDUCTIONS

The total reduction of GHG emissions for this project is calculated based on the summation of avoided CO_{2e} emissions. Total emissions reduction is obtained by subtracting the emissions in the project scenario from the baseline scenario. The next table summarizes the emissions from the baseline and project and the resulting emission reductions achieved from the project.

Table 4 Emission reductions

	Baseline Scenario	Project Scenario	Reduction
2004	126808.6	15538.5	111270.1
2005	126980.8	16466.4	110514.5
2006	134937.7	17915.2	117022.5
2007	146506.5	17965.8	128540.8
2008	148234.1	26968.0	121266.1
2009	149563.4	29202.4	120361.0
2010	167144.3	31436.8	135707.5
2011	192918.1	31882.5	161035.6
SUMMARY			
		Total Reduction	1005717.9

9.0 GHG OFFSETS AND VERIFIED EMISSION REDUCTION (VER)

The GHG emission reduction allocation is done for every year that Resource Polymers was in the plastic recycling business. Offsets will be VER (Verified Emission Reductions) once finalized by verification. The company is currently working to finalize and verify these emission reductions.

Allowance	**Total Emission Reductions**
Year	**tCO_2 equiv.**
Goods	**Emission Reductions**
2004	**111270.1**
2005	**110514.5**
2006	**117022.5**
2007	**128540.8**
2008	**121266.1**
2009	**120361.0**
2010	**135707.5**
2011	**161035.6**
TOTAL	**1,005,717**

The Emission reduction forecast is based on Resource Polymer's technology and 2011 production; no change will be implemented before a new, more efficient and more profitable manufacturing technology will be available. However due to the long-term Resource Polymers equipment useful life, it is expected that the company remains in the same situation until 2034.

Table 5: Future Emission Reduction and GHG offsets Objectives

Allowance	**Total Emission Reductions**
Year	**tCO_2 equiv.**
Goods	Future Emission Reduction
2012-2015	400,000
2016-2020	500,000
2021-2025	500,000
2026-2030	500,000
2031-2034	500,000
TOTAL	**2,400,000**

10.0 UNCERTAINTY AND LIMITS

Plastic resin emission factors used in the calculations come from a recognized source: U.S. Environmental Protection Agency which limit the uncertainty related to their accuracy. Conditions in which those emission factors have been used allow our calculations to be in the same range as EPA.

Since the United States has a similar industrial structure as ours and a similar emission factors for fuel sources (diesel, natural gas, etc)(Diesel is 73.15 kg/CO_2 and natural gas is 54.01 Kg/ CO_2 /MMBTU in the United States[17] and in Canada diesel is 2.633 G/L CO_2 and natural gas is 1879 g/m^3/CO_2). [18] The uncertainty could come from the electricity since in Ontario we have an emission factor of 2.58 X 10^{-1} tm CO_2 /KWh compared to 6.1 X 10^{-4} tm CO_2/KWH in the USA. Since we do not take in consideration the actual emissions we then reduce the risk related to this uncertainty. Thus, it makes the entire project more conservative to the total estimated GHG emission reduction of the project.

A revision of the different emission factors must be done each year in order adjust the emission reduction if necessary.

We can conclude that the uncertainty is low since we followed the EPA methodology found in *Solid Waste Management and Greenhouse Gases – Life-Cycle Assessment of Emissions and Sinks.*

11.0 DATA COLLECTION AND MONITORING

Basic inputs and outputs of Resource Polymers are handled by weighing some of the loads entering the receiving area and leaving the shipping area. For the other loads, Resource Polymers take directly the data from their suppliers.

All entries are then handled manually by accounting and aggregated on Microsoft Excel spreadsheets that are produced daily. All the data related to the sales are then entered into Quickbooks. Mr. Jamie Allison is responsible to provide and collect all project data available for quantification monitoring.

12.0 ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Impact Assessment (EIA) is not necessary for Resource Polymers project as it respects Canadian environmental laws and regulations.

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17 EPA - US Energy Information Association www.eia.doe.gov/oiaf/
18 Environment Canada - **http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1**

13.0 CONCLUSION

An exhaustive study has been realized on Resource Polymers Inc. emission sources. We have considered all data that have an impact on CO_2 emission and reduction. Plant visit, production and energy consumption data as well as different studies have been examined and a rigorous analysis has been done of the company emissions situation.

ISO 14 064 part 2 standard has been followed in order to have this report registered on CSA GHG Clean Projects™ Registry.